Update on Overshoot-Limit Proposal

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Background

- In the March 17 interim meeting, we presented the overshoot limit as a preferred method of achieving robust Tx compliance (rodes_3cu_01a_031720)
- After discussion, the Task Force voted in favor of using overshoot limit
- This presentation follows that guidance and it proposes text for 802.3cu draft
- We gratefully acknowledge expert help we have received from Pavel Zivny, Greg LeCheminant, and Mark Kimber

Proposed changes to the draft

Table 140-6 (page 41)

Add a new row for “Transmitter peak-to-peak power (max)" and add values of 5 dBm for 100GBASE-FR1 and 5.8 dBm for 100GBASE-LR1.

Change “Transmitter over/under-shoot (max)” value for 100GBASE-FR1 and 100GBASE-LR1 from 12% to 22%

Table 140-10 (page 45)

Add a new row for “Transmitter peak-to-peak power”, pattern: 6, related subclause: 140.7.12

Change “Transmitter over/under-shoot” pattern to “6”.

Proposed changes to the draft

Definition:

Add a new section:

140.7.12 Transmitter peak-to-peak power

The transmitter peak-to-peak power of each lane shall be within the limits given in Table 140–6 if measured using a test pattern specified for transmitter peak-to-peak power in Table 140–10.

Transmitter peak-to-peak power is the difference of the maximum observed power at any location of the unequalized waveform and the minimum observed power at any location of the unequalized waveform. It is measured using the TDECQ reference receiver (see subclause 140.7.5) with the equalizer turned off.

Proposed changes to the draft

Add the following text after the first paragraph of 140.7.11 and remove the Editor's Note.

Transmitter over/under-shoot is measured using the TDECQ reference receiver (see subclause 140.7.5) with the equalizer turned off.

Transmitter overshoot is defined as the maximum power from the transmitter (Pmax) relative to the level 3 power and the transmitter OMAouter according to:

Transmitter overshoot % = (Pmax-P3)/OMAouter x 100

Transmitter undershoot is defined as the minimum power from the transmitter (Pmin) relative to the level 0 power and the transmitter OMAouter according to:

Transmitter undershoot % = (P0-Pmin)/OMAouter x 100

Where Pmax is the maximum power observed anywhere in the unequalized transmitter waveform. Pmin is the minimum power observed anywhere in the unequalized transmitter waveform. P3 is the power of the PAM4 level 3, P0 is the power of the PAM4 level 0, and OMAouter is the optical modulation amplitude, all defined in clause 122.8.4

Proposed changes to the draft

Table 151-7

Add a new row in Table 151-7 for “Transmitter peak-to-peak power (max)” with values of 4.5 dBm for 400GBASE-FR4 and 5.2 dBm for 400GBASE-LR4-6.

Change “Transmitter over/under-shoot (max)” value for 400GBASE-FR4 and 400GBASE-LR4-6 from 12% to 22%.

Table 151-11

Add a new row for “Transmitter peak-to-peak power”, pattern: 6, related subclause: 151.8.13

Change “Transmitter over/under-shoot” pattern to “6”.

Proposed changes to the draft

Add the following new section:

151.8.13 Transmitter peak-to-peak power

The transmitter peak-to-peak power of each lane shall be within the limits given in Table 151-7 if measured using a test pattern specified for transmitter peak-to-peak power in Table 151-11. It is measured using the TDECQ reference receiver (see subclause 151.8.5) with the equalizer turned off.

Transmitter peak-to-peak power is the difference of the maximum observed power at any location of the unequalized waveform and the minimum observed power at any location of the unequalized waveform.

Proposed changes to the draft

Add the following text after the first paragraph of 151.8.12 and remove the Editor's Note.

Transmitter over/under-shoot is measured using the TDECQ reference receiver (see subclause 151.8.5) with the equalizer turned off.

Transmitter overshoot is defined as the maximum power from the transmitter (Pmax) relative to the level 3 power and the transmitter OMAouter according to:

Transmitter overshoot % = (Pmax-P3)/OMAouter x 100

Transmitter undershoot is defined as the minimum power from the transmitter (Pmin) relative to the level 0 power and the transmitter OMAouter according to:

Transmitter undershoot %= (P0-Pmin)/OMAouter x 100

Where Pmax is the maximum power observed anywhere in the unequalized transmitter waveform. Pmin is the minimum power observed anywhere in the unequalized transmitter waveform. P3 is the power of the PAM4 level 3, P0 is the power of the PAM4 level 0, and OMAouter is the optical modulation amplitude, all defined in clause 122.8.4

Further Work

- Refine the value of overshoot limit based on more measurements and technical discussions with TF members who have expertise in test instruments and TIA design. We will consider
  - Test instrument behavior for overshoot measurement using SSPRQ pattern
  - TIA characteristics and behavior in presence of overshoot

Thank You